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Reports
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Eagle Rock Project

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THE EAGLE ROCK PROJECT

THREE TESTS TO DETERMINE THE IMPACT ON REGENERATION
FROM DOUGLAS-FIR SHELTERWOOD REMOVAL
BY SKYLINE LOGGING

BY

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ABSTRACT

Three old-growth Douglas-fir shelterwood stands were clearcut, using skyline yarding. Stocking with conifer seedlings on Units 1-3 was 88 percent, 73 percent, and 96 percent respectively before logging, and 72 percent, 50 percent and 71 percent after logging. Harvesting was done with a lateral-yarding carriage providing full or partial suspension of logs. Fuels treatment consisted of yarding residues from one unit and lopping and scattering slash on the other two. The regeneration survival level is attributed to small seedling size (95 percent were less than 24 inches tall) and to terrain conditions which provided good skyline deflection.

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LOCATION - The test areas are in the western Cascade mountains, 48 miles east of Salem, Oregon. The three timber stands used for these case studies are near the Breitenbush River, Detroit Ranger District, Willamette National Forest.

HISTORY - The Eagle Rock area was burned by wildfire in 1967. After the fire, salvage logging removed all merchantable trees which were dead or expected to die. The moderate slopes were tractor logged and the steeper portions were yarded by skyline systems.

Salvage operations resulted in several old-growth Douglas-fir stands very similar to the seed-tree stage of a shelterwood. Three of the stands were selected for these tests.

A good seed crop occurred on the test areas in 1968, but continuation of salvage logging until 1972 had some impact on regeneration stocking levels. Of the three stands studied, only Unit 3 received artificial regeneration treatment. The work was done in 1973, when 370 Douglas-fir seedlings per acre were planted.

TEST PROCEDURES - In October, 1975, stocking surveys were made on the three test units, using 1/250-acre plots in a 1.5 by 2 chain systematic grid. A plot was considered stocked if it contained one or more conifer seedlings of good vigor, and two or more years old. Almost all of the seedlings were three or more years old.

During July and August of 1976 the three shelterwood stands were entirely removed using a Madill 071 skyline yarder with a 49-foot tower and a slack-pulling carriage. Maximum lateral yarding capability was 150 feet. Logging was done by the North Fork Logging Company, Mehama, Oregon, for the timber purchaser, Young and Morgan Company.

The logging contract required suspension of one end of the log during in-haul, but not during lateral yarding to the skyline road. In addition, yarding logs entirely clear of the ground was required on about one-third of Unit 1, because terrain made it practical to do so (see area "FF" on map).

Post-logging treatment of residues was not the same on all tracts. On Unit 1, unutilized material eight inches in diameter and ten feet long or larger was yarded out of the unit. On Units 2 and 3, logging residues were lopped to within 18 inches of the ground and scattered.

In May, 1977 the original stocking surveys were duplicated. No attempt was made to re-measure the original plots, but the sample points of the second survey were in close proximity to those of the original sample. Seedlings were counted only if not severely damaged and not permanently buried by debris.

RESULTS - Table I shows details of the stocking levels before and after logging. Stocking decreased on all units, and for the three combined, an 86 percent pre-harvest stocking level decreased to 66 percent after overstory removal.

Some of the statistical criteria for the paired t-test were not met, but paired t-test calculations show a significant difference in populations before and after timber harvesting ^{1/}.

^{1/} Because the remeasurement was approximately superimposed over the original measurement, the plots were neither truly paired nor independent.

TABLE I - SEEDLING STOCKING BEFORE AND AFTER COMPLETE OVERWOOD REMOVAL

Stand	Plot Status	<u>Before Removal</u>			<u>After Removal</u>			Fuel Treatment	Log Suspension During Yarding Inhaul
		No. Plots	%*	Trees Per Acre **	No. Plots	%*	Trees Per Acre **		
1	Stocked	52	88+5	1,360	42	72+8	860	Yard Unutilized material, 8"x10' or larger	Full Suspension on 1/3 of area. One end suspen- sion on remainder
	Non-Stocked	7	12		16	28			
	Total	59	100		58	100			
2	Stocked	27	73+10	880	18	50+17	380	Lop & Scatter	One end suspension
	Non-Stocked	10	27		18	50			
	Total	37	100		36	100			
3	Stocked	27	96+4	1,660	20	71+12	830	Lop & Scatter	One end suspension
	Non-Stocked	1	4		8	29			
	Total	28	100		28	100			
ALL	Stocked	106	86+4	1,280	80	66+7	700	-----	-----
	Non-Stocked	18	14		42	34			
	Total	124	100		122	100			

*1 Standard Error

**Per: Surveying Forest Lands for stocking by Dale N. Bever
 Research Note 44, May 1961
 Oregon Forest Research Center, Corvallis

DISCUSSION - These three tests indicate that a substantial amount of seedlings can survive the shelterwood removal cut in old-growth Douglas-fir, using a skyline yarding system. Where site severity precludes adequate regeneration of clearcuts, shelterwood is an option in the coastal Douglas-fir type. Little information has previously been published about the impact on regeneration resulting from the shelterwood removal cut in Douglas-fir forests.

Two characteristics of the test areas contributed to seedling survival during logging. Topography provided adequate skyline deflection for suspension of at least one end of the log during in-haul. Seedlings were small enough to avoid or survive mechanical abuse (see Table III).

The volume of timber harvested per acre was higher than would normally be necessary for an adequate Douglas-fir shelterwood. A lower volume of overstory may improve seedling survival of the overstory removal.

DESCRIPTIVE DATA

For the Three Test Cases Combined

Gross volume removed per acre	43 Mb.f.
Net volume removed per acre	23 Mb.f.
Average number of logs removed per acre	60
Average tree D.B.H.	40 inches
Average number of trees harvested per acre	14

TABLE II
UNIT TOPOGRAPHY

Unit	Acres	Elevation	Aspect	Slope
1	20	3,400-3,700	SW	1/2 is 0-15%, 1/2 is 50%
2	11	2,800-3,100	S to W	60%
3	9	2600-2900	S to W	3/4 is 60%, 1/4 is 40%

TABLE III
HEIGHT CLASS DISTRIBUTION OF SEEDLINGS BEFORE LOGGING
Height Class

1"-12"	13"-24"	25"-36"	37"-48"
82.1%	13.2%	3.8%	0.9%

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Figure 1. A Portion Of Unit 2 Before Overstory Removal



Figure 2. A Portion Of Unit 2 After Overstory Removal

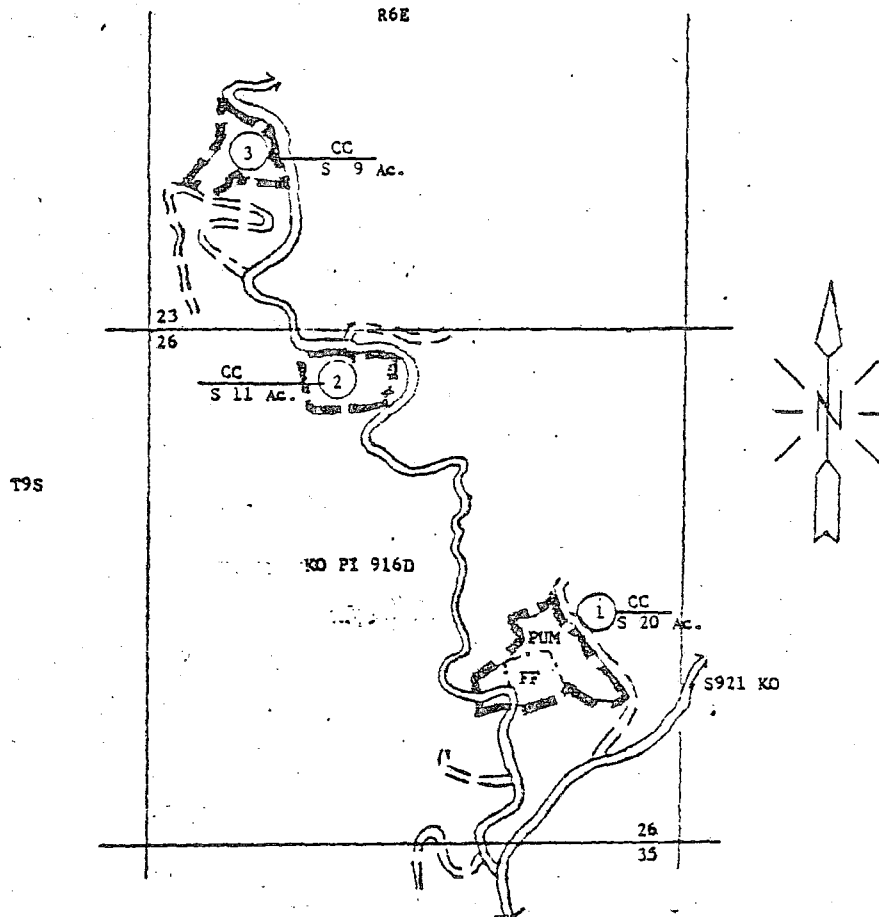


Figure 3. Seedlings Surviving After Overstory Removal



Figure 4. Damaged And Undamaged Seedlings After Overstory Removal

SALE AREA MAP AND SLASH DISPOSAL MAP
 SALE NAME: EAGLE ROCK REMOVAL
 NATIONAL FOREST: WILLAMETTE
 RANGER DISTRICT: DETROIT



LEGEND

- Subdivision Boundary B1.1
- Subdivision Marked Prior to Advertisement B1.1
- Clearcutting Unit and No. B2.31
- Existing Temporary Road B5.12
- PI Road Protect Improvement, B6.22
- KO Keep Road or Trail Open, B6.22
- S Skyline Yarding Specified, B6.42
- Specific Skidding or Yarding Boundary B6.42
- FF Logs Flown Free of Ground.
- PUM Areas Requiring Piling of Unutilized Material C6.74# Option 4

Sale Area Boundary is designated as 200 feet slope distance beyond Subdivision Boundary B1.1

Scarification of landing and spur roads by Purchaser is required C6.4

Subdivisions 2 and 3 are designated for lopping of unutilized material to less than 18 inches above the ground C6.74, Option 1.

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